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PARALLEL COMPUTING IMPLEMENTATION FOR ScanSAR MODE DATA

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Synthetic aperture radar (SAR) data processing has matured over the past decade with advances in the traditional time-domain, the more popular and efficient frequency-domain, and the relatively new and more precise chirp-scaling processing approach. Each of these approaches has spawn a multitude of processing algorithms with different attributes in terms of accuracy and computation complexity that make them best suited for specific applications. One common trait amongst al 1 SA R data processing algorithms, however, is their iterative and repetitive nature that makes them amenable to parallel computing implementation. With SAR's contribution to remote sensing now well-established, the processing throughput demand has increased steadily with each new mission and each new application such as Earth resource management via polarization and frequency diversity and terrain information extraction via interferometry. Parallel computing implementation of SAR processing algorithms therefore is becoming an important means of attaining high SAR data processing throughput to help satisfy Science demand.

This paper concerns parallel computing implementation of a mode of data called ScanSAR. ScanSAR has the unique advantage of yielding wide swath coverage within a single data collection pass. This mode of data collection has been demonstrated on SIR-C and is going to be used operationally for the first time on Radarsat. The burst nature of ScanSAR, coupled with different parallel computing architect ure, offers many ways of parallel computing implementation. This paper gives a description of the modern parallel computing architecture, and reports on a recent l y completed study of implementing ScanSAR data processing on a number parallel computers. Specific examples of ScanSAR parallel processing implementation with Radarsat and SIR-C data are given. Practical parallelization techniques that are applicable to conventional continuous mode SAR are also identified.